CLAIMS

1. An antenna for transmitting or receiving electromagnetic waves comprising several electric dipoles, characterized in that the dipoles are arranged in pairs of oppositely located dipoles, that the two dipoles of each pair are radiating or receiving with approximately the same amplitude and phase, that at least some of said dipole pairs have different properties, and preferably different dimensions or orientations, and that they are arranged in such a way that the geometrical centres of each dipole pair are at least approximately coinciding.

2. An antenna according to claim 1, wherein all dipole pairs are oriented in one direction in order to transmit or receive waves of one linear polarization.

3. An antenna according to claim 1, wherein approximately half the dipole pairs are oriented in one direction and the rest in an orthogonal direction, in order to transmit or receive waves of dual linear polarization or circular polarization.

4. An antenna according to any one of the preceding claims, wherein the dipoles are located above a conducting body acting as a ground plane.

5. An antenna according to claim 4, wherein the metal lines connecting neighbouring dipoles do not cross each other.

6. An antenna according to claim 4 or 5, wherein the conducting body located under the dipoles and acting as a ground plane is non-flat.

7. An antenna according to any one of the preceding claims, wherein the dipoles are V-shaped or curved.

8. An antenna according to any one of the preceding claims, wherein the dipoles are made of conducting wires, tubes or strips.

9. An antenna according to any one of the preceding claims, wherein the dipoles are made by conducting strips on a dielectric substrate.

10. An antenna according to any one of the preceding claims, wherein the dipoles are excited by connecting together the endpoints of neighbouring parallel dipoles so that they form serpentine-shaped lines from one or more feed points.

11. An antenna according to any one of claims 1 to 9, wherein at least one dipole comprises two oppositely directed conducting arms with a feed gap between them, and preferably several dipoles, and most preferably essentially all dipoles.

12. An antenna according to claim 11, wherein each dipole arm comprises two or more conducting lines that are connected together at one or more points or over an extended part of the arm.

13. An antenna according to claims 11 or 12, wherein the feed gaps of neighbouring dipoles of different dipole pairs are excited by two-conductor feed lines starting from one or more feed points.

14. An antenna according to any one of the preceding claims, wherein each dipole consists of two opposite arms, and each dipole arm comprises two conducting lines that are connected at the outer end whereas the inner end at a feed gap is connected with the inner end of the closest line of a neighbouring inner or outer dipole arm, so that one set of dipoles with feed lines are formed by two opposing serpentine-shaped lines.

15. An antenna according to any one of the preceding claims, wherein the dimensions of each dipole pair are essentially as follows: dipole length approximately 0.5 wavelengths, dipole height over ground between 0.05 and 0.30 wavelengths, and dipole spacing approximately 0.5 wavelengths, where the wavelengths is for that frequency of which the given dipole pair is the dominating contributor to the radiation pattern.

16. An antenna according to any one of the preceding claims, wherein the dimensions of the different dipole pairs varies in a log-periodic manner in order to make a very broadband overall performance.

17. An antenna according to any one of the preceding claims, wherein the radiation patterns have an almost constant beam width over a very wide frequency band that may be several octaves.

18. An antenna according to any one of the preceding claims, wherein the antenna is used to illuminate a single or dual reflector antenna system.

19. An antenna according to any one of the preceding claims, wherein at least one balun is arranged in the central region between a pair of dipoles, and preferably between the smallest dipoles.

20. An antenna according to any one of the proceeding claims, wherein at least one 180 deg hybrid is arranged in the central region between a pair of dipoles, and preferably between the smallest dipoles.

21. An antenna according to claims 19 or 20, wherein the balun or 180 deg hybrid is realized as an active circuit including transistor amplifiers.

22. An antenna according to claims 19, 20 or 21, as dependent on any one of claims 4-6, wherein the balun or

180 deg hybrid is located behind the ground plane in the central region with transmission lines providing the connection through the ground plane.

23. An antenna according to any one of the preceding claims, wherein at least one dipole comprises two oppositely directed conducting arms with a feed gap between them, and wherein the feed gaps of neighbouring dipoles of different dipole pairs are excited by a two-conductor feed line starting from one or more feed points, the two separate conductors of the two-conductor feed line being arranged in at least two different, non-intersecting planes.

24. An antenna according to claim 23, wherein the two-conductor feed line comprise a first conductor in a first plane, and a second conductor at least partly arranged in a second plane, said first and second planes being different and non-intersecting to each other.

25. An antenna according to claim 24, wherein at least part of the dipole arms are arranged in said first plane.

26. An antenna according to claim 24 or 25, wherein the dipoles are made by conducting strips on a dielectric substrate, and wherein the first and second planes are arranged on different sides of said substrate.

27. An antenna according to any one of the preceding claims, wherein essentially all dipoles are arranged on one side of a substrate, and a first conductor of a two-conductor feed line is arranged on this side of the substrate, whereas a second conductor of said two-conductor feed line is arranged at least partly on an opposite side of the substrate, and being connected to the dipoles through the substrate.

28. An antenna according to claim 27, wherein the second conductor connects dipoles within at least some of the dipole pairs to each other, said dipole pairs thereby being excited by electromagnetic coupling to neighbouring dipoles.

29. An antenna according to any one of the claims 1-26, wherein for at least some of the dipoles, and preferably essentially all the dipoles, the dipoles' arms are arranged on opposite sides of a substrate, and wherein a separate conductor of a two-conductor feed line is arranged on each side for exciting the dipole arms arranged on said sides.

30. An antenna according to any one of the claims 1-26, wherein essentially all dipole arms are arranged on one side of a substrate, and the conductors of a feed line are winded in parallel on a dielectric rod so that different windings of the lines are connected to different dipole arms.

31. An antenna according to any one of the preceding claims, wherein at least some of the dipole pairs have dipoles being connected to separate feed lines.

32. An antenna according to any one of the preceding claims, wherein at least some neighbouring dipole pairs are connected to separate feed lines.